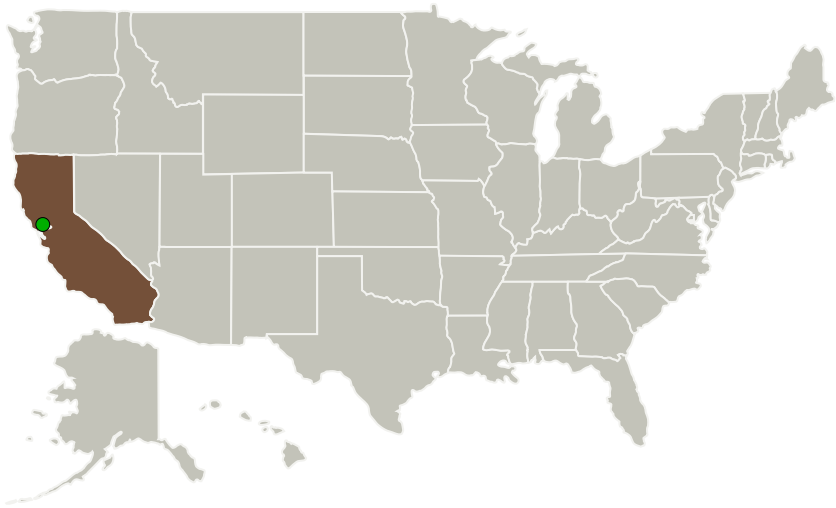
Distributed Data Mining for Aircraft Health Management, Phase I

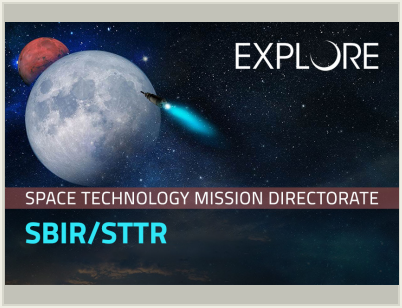
Completed Technology Project (2011 - 2011)

Project Introduction

NASA, DoD, and commercial aircraft operators need to transform vast amounts of aircraft data accumulated in distributed databases into actionable knowledge. We propose distributed algorithms for data-driven health monitoring on aircraft, aircraft fleet, and national airspace levels. The proposed algorithms are based on distributed optimization formulation, and, unlike existing distributed processing methods, have rigorous guarantees of producing the same results as centralized processing would do. Our algorithms will be implemented in an open scalable framework that allows integrating distributed data and federated third party algorithms for anomaly detection, diagnosis, prediction, and prognosis. We will apply the proposed approach to aircraft performance monitoring from FOQA data. We will train regression models of aircraft performance using distributed agents associated with different data sets, locations, and organizations. The trained models will be then used for anomaly detection, diagnosis (fault isolation), prognosis (forecasting), and mitigation (decision support). This project will develop web-based distributed open architecture software implementing the proposed optimization-based approaches and demonstrate scalability to at least 10 TB of data. Besides the developed algorithms, we will explore integration of third party algorithms into the distributed environment. The developed technologies will be applicable to a broad range of aircraft-related and other problems.

Primary U.S. Work Locations and Key Partners





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Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
Mitek Analytics LLC	Lead Organization	Industry	Palo Alto, California
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations
California

Project Transitions

February 2011: Project Start

September 2011: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140169)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Mitek Analytics LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

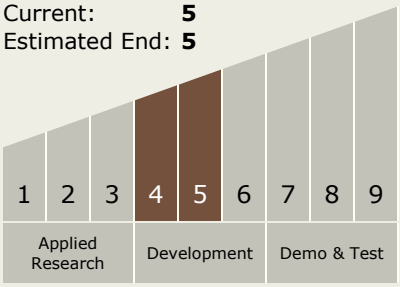
Carlos Torrez

Principal Investigator:

Dimitry Gorinevsky

Technology Maturity (TRL)

Start: **4**
Current: **5**
Estimated End: **5**



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Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
  - TX11.4 Information Processing
    - TX11.4.5 Cyber Infrastructure

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System